BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

REMARKS

Favorable reconsideration is respectfully requested.

The claims are 33-41.

In Official Action paragraph 3, claims 33-41 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement, since the specification does not describe how the water-dispersible polymer and the ethylenically unsaturated compound of claim 33 would not react with each other when "irradiated with UV radiation." These polymers are said by the rejection to inherently react when irradiated.

This rejection is respectfully traversed.

There is no need to describe in the specification how the mixture consisting essentially of water dispersible polymer and ethylenically unsaturated compound and no photo-initiator would be prevented from reacting under UV, as it just would not react. To explain in further detail, the surface layer could not be cured thermally because the high temperature required for a thermal cure would melt or damage the underlying polymer film substrate. Such high temperatures would never be used to dry the film coating. Therefore, the claim describes a surface layer of the present invention which contains reactive groups uncured either by UV or thermally prior to printing.

The formulations described in the cited Mehta reference are completely different because they are fully cured. Mehta absolutely does not provide evidence that the same formulations would react under UV. Mehta recites "If cured by electron beam radiation, it is not necessary to include an initiator in the composition" (col. 4, lines 67 to 69). So the initiator is not optional for UV curing – it is only optionally for e-beam curing. In either case, it is absolutely clear that the intent of Mehta is to achieve complete cross-linking to provide a durable polymer coating to protect "the substrate from heat, moisture, abrasion and solvents" (col. 2; lines 28 to 30).

Prior to printing, the coated film of the claimed invention will have unreacted groups thereon to react with the UV ink. The coatings of Mehta are fully cross-linked prior to any optional further printing to protect the underlying layers and substrate.

In Official Action paragraph 5, claim 34 has been rejected as indefinite because it requires the water-dispersible polymer to form a matrix in which the second component is dispersed. However, claim 34 depends from claim 33, which allows for only 10% of the polymer and 90% of the second component. According to the rejection, these ratios would not allow the polymer to form a matrix in which the second component could be dispersed.

In reply, claim 34 has been amended to satisfy the contention that 10% of a polymer cannot act as a matrix for 90% of the ethylenically unsaturated compound.

Claims 33 and 35-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Mehta et al. (U.S. 5,219,641) as set forth in the previous action.

This rejection is respectfully traversed.

A brief discussion of the present invention will be of assistance in appreciating Applicants' reasons for traversal of the rejection.

There is a fundamental difference between the fully UV cross-linked protective coats of Mehta and the functionalized surface coats of Applicants' film which is not cross-linked before printing. It is only after printing when the three components of polymer, unsaturated compound and UV ink are present that the printed coat of the invention will react under UV to bind the ink to the surface.

The Official Action fails to appreciate the difference between an unprinted film prior to application of the UV curable ink and the film printed with the ink which is then cured. The unprinted film is what is covered by the present claims. Printing of the film and UV curing of the ink to bind onto the film surface is a separate step which will be done by those using the product of the present claims. These differences will now be explained in detail.

Coating of the unprinted film during manufacture

A film is coated with a surface layer which consists essentially of a water-dispersible polymer and an ethylenically unsaturated compound, i.e. there are only two components in this layer. Under the conditions experienced by the film before printing, these components do not react together but are available to react with the ink. The surface layer cannot be cured by UV because there is no photo-initiator. The last phrase in the claim "does not react ... when said layer is irradiated with UV radiation" further

emphasizes this. It states explicitly what is already implicit in the rest of the claim. So the two components on their own do not react if by chance they are irradiated by UV before printing (it does not say they would not react if irradiated by for example an electron beam). In practice, of course, the film would not be illuminated by UV until after printing and this would be done by the end user, not the film manufacturer.

The coated film is printed with a UV curable ink

After the film has been coated and dried, the unprinted film is sold by the manufacturer to end users. It is the end users that print the surface layer of water-dispersible polymer in addition to ethylenically unsaturated compound with a UV curable ink. The surface layer then has three components: UV curable ink, water-dispersible polymer and the ethylenically unsaturated compound. It is only post printing that when the surface layer is irradiated with UV that these components can react so the ink is well bonded to the film.

A smooth surface is not necessary to distinguish over Mehta, so the first point of the rejection is moot.

As pointed out above, the present invention as claimed inherently leads to a surface layer with unreacted groups. However the present application has a passage which also refers to cross-linking which may have confused the matter (paragraph 0029 of the published text US 2002/0098340A1). If it would help, Applicants are willing to delete this paragraph from the present application.

Mehta teaches pre-printing but also that the coatings are designed to protect a substrate from heat, moisture abrasion and solvents. (col. 2, lines 8 to 9). This clearly teaches that the coatings of Mehta are fully polymerized. It is in this context (protection of substrate) that Mehta suggests that the coating can be applied to pre-printed or uncoated substrates.

The rejection argues that Mehta contains the same compound which would also act as a plasticizer but this begs the question of whether Mehta contains unreacted groups. As Applicants have consistently pointed out, the Mehta monomers are fully polymerized and cannot be plasticizers. In the coating of the present invention the components are unreacted prior to printing so the ethylenically unsaturated compound can act as a plasticizer prior to printing.

The IUPAC Compendium of Chemical Terminology 2nd Edition (1997) available from the IUPAC web site http://www.iupac.org/publications/compendium/index.html, contains definitions that show there is a difference between an oligomer and a polymer, which would be understood by a skilled addressee of Mehta.

Polymer = A substance composed of macromolecules.

Macromolecule (polymer molecule) = A molecule of high relative molecular mass, the structure of which essentially comprises the multiple repetition of units derived, actually or conceptually, from molecules of low relative molecular mass.

Notes:

1. In many cases, especially for synthetic polymers, a molecule can be regarded as having a high relative molecular mass if the addition or removal of one or a few of the units has a negligible effect on the molecular properties. This statement fails in the case of certain macromolecules for which the properties may be critically dependent on fine details of the molecular structure.

2. If a part or the whole of the molecule has a high relative molecular mass and essentially comprises the multiple repetition of units derived, actually or conceptually, from molecules of low relative molecular mass, it may be described as either macromolecular or polymeric, or by polymer used adjectivally.

Oligomer = A substance composed of oligomer molecules. An oligomer obtained by telomerization is often termed a telomer.

Oligomer molecule = A molecule of intermediate relative molecular mass, the structure of which essentially comprises a small plurality of units derived, actually or conceptually, from molecules of lower relative molecular mass.

Notes:

1. A molecule is regarded as having an intermediate relative molecular mass if it has properties which do vary significantly with the removal of one or a few of the units.

2. If a part or the whole of the molecule has an intermediate relative molecular mass and essentially comprises a small plurality of units derived, actually or conceptually, from molecules of lower relative molecular mass, it may be described as oligomeric, or by oligomer used adjectivally.

Accordingly, the meanings of the terms polymer and oligomer must be interpreted in the context of both documents where they are used and within the scope of the standard definitions given above.

The coatings of Mehta use oligomers (defined by IUPAC to have intermediate molecular mass) which are polymerized to form a fully cross-linked coating. Before polymerization, the oligomers do not have to be of high molecular weight as the desired protective properties of the Mehta coating are achieved by polymerizing these oligomers. The use of higher molecular mass polymers would be unnecessary if a polymeric coat is to be formed. Indeed the use of oligomers is treated as a positive advantage, as Mehta states "An advantage of the present invention is the ability to apply the coating in liquid form...." (col. 3, lines 38 to 39). Mehta thus teaches away from using higher molecular mass polymers as polymer precursors to make the polymeric coating.

In contrast, the coatings of the present invention, when unprinted, rely on the water-dispersible polymer to provide the hardness and durability to the surface layer. There is no reaction between the polymer and the ethylenically unsaturated compound. Thus, a polymer is used (defined by IUPAC to have a high molecular mass) and not an oligomer to provide the desired properties to the surface layer.

Claim 34 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Mehta (U.S. 5,219,641), as set forth in the last action.

In reply to Applicants' argument that the instant invention is able to form a matrix because it utilizes a polymer instead of the oligomer used by Mehta, the rejection states that there is no evidence that an oligomer would not act like other polymers to form a matrix.

In reply, claim 34 has been amended to overcome this rejection, as discussed above.

Claims 39-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehta et al. (U.S. 5,219,641) in view of Kuburaki et al. (U.S. 5,047,286) as set forth in the last action.

This rejection is respectfully traversed.

There are many types of printing which require different and incompatible properties in the substrate to be printed. This is self-evident by the active research programs in the industry to develop and optimize substrate coatings for the latest printing methods (such as ink-jet, laser, thermal-transfer, flexographic, gravure, offset etc.). If the assertion in the Official Action were correct that all printing techniques were interchangeable, all this activity would be wasted.

The particular references (Mehta and Kuburaki) are chosen from printing techniques (respectively thermal transfer printing and offset printing) which are especially incompatible. For example, the heat sensitive components required for thermal printing would be undesirable under the conditions experience in an offset printer. To one skilled in the art, a coating which may be optimized for use with one printing method is not necessarily useful in another. A reader of Mehta would be actively deterred from cross-referencing Kuburaki (or vice versa) given the different printing techniques used.

It is also noted that Kuburaki describes but does not claim some acrylate oligomers for example see Examples 2 and 3. These oligomers have much larger molecular weights (1,000 or more) than those compounds used in the present invention (see also col.3 lines 16 to 20 of Kuburaki). In any event even if such oligomers were added to the coating formulations of Kuburaki they would behave differently than in the coatings of to the present invention. In the presence of the metal ions component (e.g. element (c) of claim 1) any smaller oligomer components would become unstable and self cross-link to form larger polymers. So the acrylate based polymers would not plasticize the film and would not be available for reacting with a UV curable ink. Indeed to provide such functionality is why the cinnamic acid derivative is added, which thus teaches directly away from the surface layers of the present invention where the ethylenically unsaturated compound performs this function.

For the foregoing reasons, it is apparent that the rejection on Mehta and Kuburaki is untenable and should be withdrawn.

No further issues remaining, allowance of this application is respectfully requested.

If, for any reason, the Examiner considers that the present response does not place this application in condition for allowance, he is respectfully requested to contact

undersigned to resolve any outstanding issues, perhaps by telephone or personal interview.

Respectfully submitted,

Alastair Hugh SERVANTE et al.

By: _____

Matthew M. Jacob
Registration No. 25,154
Attorney for Applicants

MJ/da
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
November 3, 2003